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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

F. Grey
#19756
(15026)

Brief
9/25/97

In re Application of:

Paul Steven MARSHALL

x

: Examiner: S. Yount

For: VIRTUAL REALITY GENERATOR
FOR USE WITH FINANCIAL
INFORMATION

:

: Art Unit: 2411

Filed: June 27, 1994

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Serial No.: 08/267,108

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x

Assistant Commissioner
for Patents

Washington, D.C. 20231

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Jonathan S. Casper (Reg. No. 38,094)

APPEAL BRIEF PURSUANT TO 37 C.F.R. § 1.192(a)

SIR:

On March 10, 1997, Appellant submitted a Notice of Appeal from the final rejection of claims 85-92 and 94-127 contained in the Final Office Action mailed by the U.S. Patent and Trademark Office on April 8, 1996 in the above-identified patent application. The Notice of Appeal was received by the U.S. Patent and Trademark Office on March 13, 1996.

In accordance with 37 C.F.R. § 1.192(a), this brief is submitted in triplicate in support of the appeal of the final rejection of claims 85-92 and 94-127. For the reasons set forth below, the final rejection of claims 85-92 and 94-127 should be reversed.

1. REAL PARTY IN INTEREST

The real party in interest in the present appeal is the inventor named in the caption of this brief - Paul Steven Marshall - who owns the entire right, title and interest in the present application.

2. RELATED APPEALS AND INTERFERENCES

There are no interferences or other appeals related to the present application.

3. STATUS OF CLAIMS

Claims 1-84 were filed with the above-identified application on June 27, 1994, which were then canceled and replaced with new claims 85-125. In response to a Final Office Action dated October 31, 1995, Appellant amended claims 85, 87, 92-94, 97, 98, 102, 104, 106, 108, 115, 118, 121 and 123-125 pursuant to 37 C.F.R. § 1.129(a). In response to a non-final Office Action dated May 22, 1996, Appellant canceled claim 93, amended claims 85, 87, 92, 94, 97, 98, 102, 104, 106, 108, 115, 118, 121 and 123-125, and added new claims 126 and 127.

Claims 85-92 and 94-127 stand finally rejected under 35 U.S.C. § 103 as being unpatentable over Cyberarts: Lanier of VPL on "Voomies" by Rohrbough (the "Rohrbough article") and Virtual Reality: a status report by Jacobson (the "Jacobson article"), in further view of Virtual reality offers growing opportunity for risk takers by Hindus (the "Hindus article"), Virtual Reality is almost real by Saffo (the "Saffo article"), PV-wave for Financial Applications ("PV-Wave 1"), PV-Wave Command Language ("PV-Wave 2"), and PV-Wave Point and Click Visual Data Analysis Software ("PV-Wave 3").

Appellant appeals from the final rejection of claims 85-92 and 94-127. A copy of the claims on appeal is attached hereto in the Appendix.

4. STATUS OF AMENDMENTS

Appellant has filed no Amendments in response to the Examiner's Final Office Action dated December 9, 1996. In response to the Final Office Action, Appellant submitted a Notice of Appeal on March 10, 1997, which was received in the Patent Office on March 13, 1997. This brief is submitted in support of that appeal.

5. SUMMARY OF THE INVENTION

The present invention relates to a virtual reality generator and method to allow money manager and financial analysts to easily view otherwise unmanageable amount so of complex information and in particular, financial information about financial markets such as information about equities, commodities, currencies, derivatives and their related markets. See e.g., Appellant's specification at p. 6, lines 26-32. An exemplary embodiment of the above-identified application generates a virtual reality world (three-dimensional virtual reality world) from, for example, financial information. The virtual reality world presents specific financial information as three dimensional objects, or metaphors, as part of the virtual reality world. The user is able to view, manipulate, and travel through the metaphors, which are displayed in such a way as to allow the user to easily locate relevant financial information, interact with different characteristics and see financial trends. Id. at p. 7, lines 2-21.

The virtual reality world created according to the present invention using financial information displays a hybrid of financial information and market geography representing a virtual financial world having terrain categorized and structured to enable a user to easily extract patterns and interconnections. For example, the geography of the virtual reality world is defined, in part, by a three-dimensional coordinate system that sets out the borders of "geographical" features int he terrain. The geography can represent information elements that are non-integer taxonomies of the financial information. See, e.g., Appellant's specification at p. 7, line 28 through p. 8, line 8.

In particular, the virtual reality generator of the above-identified application includes a number of modules. A first module (e.g., an input module) receives a stream of pre-processed financial information. See id. at p. 8, lines 22-25. For example, the virtual reality generator according to

the present invention receives pre-processed financial information from a conventional financial analytic system, such as the CAPRI financial analysis system, which provides, e.g., price and volume charts for any stock issue, volatility, fundamental equity statistics, graphical profit and loss and risk evaluation, and time, bond, futures and other derivative analyses. See id. at p. 9, line 15 to p. 10, line 15. A second module (e.g., a user interface module) allows the user to input criteria to select certain parts of the stream of financial data for display and to input display settings for the virtual reality world and metaphors in the virtual reality world. In effect, the user interface module allows the user to define his or her virtual reality worlds. See id., at p. 8, lines 27-30.

For example, the user selects a non-integer terrain parameter, such as financial instrument, industry group or country, for two axes of the three-dimensional interface. See id. at p. 12, lines 3-17; p. 23, lines 7-24; p. 24, line 19 to p. 26, line 4; p. 33, lines 23-27; p. 35, lines 5-14. The user also selects an axis display parameter, such as percentage price change, average high/low price or price relative to a market index, to set the display of the third axis of the three-dimensional interface (e.g., the z or vertical axis). Id. at p. 23, lines 26-34. The input module of the virtual reality generator thus provides for a non-cartesian coordinate system that is 1/3 graphical and 2/3 terrain, thereby allowing multi-dimensional (e.g., shape, color, texture, flashing, spinning, sound, location) representation of the preprocessed financial information. For example, the non-cartesian information terrain provided by the virtual generator according to the present invention allows for multiple information points to be displayed in a defined area in a virtual reality display.

Another module of the virtual reality generator generates and continuously modifies the virtual reality world representing the pre-processed financial data. Thus, the virtual reality generator of the above-identified application

allows the user to "travel through" the virtual reality world and to select metaphors in the virtual reality world for detailed display. See id. at p. 8, line 36 through p. 9, line 5.

6. ISSUES

Whether claims 85-92 and 94-127, which stand rejected under 35 U.S.C. § 103, are unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3?

7. GROUPING OF CLAIMS

Group I - claims 85, 87-89, 91-94, 96-111, 115, 116, 118, 119 and 121-127.

Group II - claims 86 and 117.

Group III - claim 90.

Group IV - claim 95.

Group V - claim 112.

Group VI - claim 113.

Group VII - claim 114.

Group VIII - claim 120.

8. ARGUMENT - Group I

Claims 85, 87-89, 91-94, 96-111, 115, 116, 118, 119 and 121-127 stand rejected under 35 U.S.C. § 103 as being unpatentable over Cyberarts: Lanier of VPL on "Voomies" by Rohrbough (the "Rohrbough article") and Virtual Reality: a status report by Jacobson (the "Jacobson article"), in further view of Virtual reality offers growing opportunity for risk

takers by Hindus (the "Hindus article"), Virtual Reality is almost real by Saffo (the "Saffo article"), PV-wave for Financial Applications ("PV-Wave 1"), PV-Wave Command Language ("PV-Wave 2"), and PV-Wave Point and Click Visual Data Analysis Software ("PV-Wave 3"). Appellant respectfully requests that the Board overturn this rejection in view of the following.

Independent claim 85 recites a virtual reality generator having:

an input module receiving the pre-processed financial information...;

a user interface module having a first input for selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter; and

a virtual reality generator module ... displaying ... the selected portion of the pre-processed financial information ... within the virtual reality world.

Similar limitations are recited in independent claims 104, 106, 118, 121 and 123-125.

In clear contrast to Appellant's invention, the art cited by the Examiner in no way teaches or suggests a virtual reality generator which receives pre-processed financial information from a financial analytic system and then selects a portion of the pre-processed financial information as a function of user-selected non-integer terrain parameters and an axis display parameter, displaying the selected portion of the pre-processed financial information as the virtual reality world, as clearly recited in independent claims 85, 104, 106, 118, 121 and 123-125 of the above-identified application.

As described in the specification by, e.g., selecting the non-integer terrain parameters and the axis display parameter, the present invention displays a hybrid of

numerical financial information and categorical market geography as a three-dimensional virtual reality world. See, e.g., Appellant's specification at p. 7, line 28 to p. 8, line 6; p. 23, lines 7-24. Appellant's novel and non-obvious use of a non-cartesian coordinate system that is 1/3 graphical and 2/3 terrain allows multi-dimensional (e.g., shape, color, texture, flashing, spinning, sound, location) virtual reality display of financial information not previously provided by the prior art.

The Jacobson article provides a status report on actual and hypothesized applications of virtual reality. Applications of virtual reality described in the Jacobson article include, for example, CAD-based building models and the building of virtual molecules for medical research. See Jacobson at 1. In addition, the Jacobson article describes the VIEW system that was developed by NASA for planning space missions -- in particular, a virtual reality display environment for data and monitors systems. Id. at 3. The Jacobson article also addresses application of virtual reality to finance, stating that virtual reality is "coming to" financial modeling, and describing a visualization technique for representing a security as a stalk of wheat. Id. at 1, 4.

At the end of the Jacobson article, it is suggested to use virtual reality for stock market predictions -- but Appellant respectfully points out that the Jacobson article completely fails to suggest that such predictions could be accomplished, noting that it "may take a while" and that such a package would be available "by the mid-1990s." Id. at 9. Appellant respectfully submits that while describing the history of virtual reality and many applications of the technology at the time, none of the existing or hypothesized applications of virtual reality described in the Jacobson article, including the "field of wheat" hypothetical, describe, much less teach or suggest, the combination of known financial analytic systems outputting pre-processed financial information to be input to a virtual reality generator, as

recited in independent claim 85.¹ Appellant further respectfully submits that neither is there any teaching or suggestion in the Jacobson article to make the further combination with virtual reality processing of a selected portion of the pre-processed financial information as a function of user-selected non-integer terrain parameters and an axis display parameter, as recited in independent claim 85.

The Rohrbough article, similar to the Jacobson article, also describes some existing and hypothesized applications of virtual reality, including building design, for example using virtual reality to develop "virtual kitchens" to be designed by customers, creating virtual movies and "turning a financial database into a giant simulated structure." See Rohrbough at 1, 2. Like the Jacobson article though, the Rohrbough article also fails to describe anything even remotely similar to the user-defined selection of pre-processed financial information which is displayed as a three-dimensional virtual reality world having one axis representing numerical financial information and the other two axes representing categorical market geography, as recited in independent claim 85.

The rejection of claim 85 asserts that the Jacobson and Rohrbough articles suggest "use of a virtual reality generator to display financial information in a virtual reality world" and that "the level of skill for the ordinary artisan ... was such that no undue experimentation would have been needed" to implement the present invention. See Office

¹ Appellant respectfully notes that a reason no one could implement a virtual reality system for real time stock analysis was due to the computational complexity of updating the virtual reality world based on both user input and changes in financial information. Appellant solved this problem in the present invention by, for example, receiving pre-processed financial information, thus allowing the virtual reality engine to concentrate on non-financial processing. As indicated previously, no cited prior art reference teaches or suggests receiving pre-processed financial information for use by a virtual reality generator, as recited in independent claim 85.

Action dated May 22, 1996 at pp. 3-4. Appellant has carefully studied the Jacobson and Rohrbough articles and respectfully asserts, at least for the reasons set forth above, that both articles fail to teach or suggest the virtual reality generator recited in independent claim 85. Moreover, since both the Jacobson and Rohrbough articles fail to teach or suggest the claimed combination of receiving preprocessed financial information and displaying selected portions of the preprocessed information on a three-dimensional interface including two non-cartesian (e.g., non-integer) axes, both articles also necessarily fail to suggest that the level of one skilled in the art was sufficient to make the virtual reality generator recited in independent claim 85.

Furthermore, the Examiner correctly notes that the Jacobson and Rohrbough articles suggest the general use of a virtual reality generator to display financial information, but the rejection fails to apply the references to the claims of the present application.² Appellant's claims recite a virtual reality generator displaying financial information as a three-dimensional virtual reality world by selecting a portion of pre-processed financial information as a function of non-integer terrain parameters and an axis display

² For example, regarding claim 97, the rejection states that "once the idea of using virtual reality for display of financial information is known, the particular data and the particular format used to display the data becomes a design choice of the user." Office Action dated May 22, 1996 at p. 9 and Office Action dated December 9, 1996 at p. 10. Appellant respectfully traverses this statement as fundamentally incorrect and in contravention of 35 U.S.C. §§ 101, 102, 103 and 112, which require that a patent be issued for novel, useful and nonobvious inventions described and claimed in the application. Unless the prior art teaches the claimed invention, including how to practice it, the claims must be allowed. The U.S. patent system is based on improvements of existing technologies. Yet, under the standard put forth in the rejection, no patents on using virtual reality to display financial information would ever issue over the cited background articles, despite novel and nonobvious systems and methods invented for displaying financial information in a virtual reality world, such as Appellant's claimed invention.

parameter, such as recited in claim 85. No portions of the cited references, either individually or in combination, teach or suggest such a virtual reality generator.

To cure the acknowledged deficiencies of the Jacobson and Rohrbough articles, five (5) additional references have been cited as "further evidence of the level of skill in the art" -- the Hindus and Saffo articles and three (3) PV-Wave brochures. See Office Action dated May 22, 1996 at p. 3. Like the Jacobson and Rohrbough articles, however, the Saffo and Hindus articles generally describe possible applications of virtual reality, such as using virtual reality to tour buildings and for molecular modeling. While the Hindus and Saffo articles discuss the potential of virtual reality, and the Saffo article mentions that the technology may lead to representing abstract data as three-dimensional structures, both of these articles fail to teach or suggest, much less even mention, a virtual reality generator displaying financial information by selecting a portion of pre-processed financial information as a function of non-integer terrain parameters and an axis display parameter, as recited in claim 85.

Furthermore, the Examiner's reliance in the rejection on the PV-Wave references is misplaced. As described in detail in Appellant's prior responses to Office Actions, the PV-Wave references provides two-dimensional and three-dimensional graphical visualization of data. Unlike a virtual reality system, however, which, as defined in the Jacobson article, allows interaction with and immersion in the displayed data such that the user can view the data from different perspectives, including from within the data, no such interaction and immersion is provided by a standard three-dimensional graphing package such as PV-Wave. Moreover, as the Examiner admits, PV-Wave nowhere mentions, much less teaches or suggests, a three-dimensional display having two non-integer axes, as recited in independent claim 85.

Indeed, Appellant respectfully asserts that the three-dimensional displays described in the PV-Wave references

teach away from the claimed invention as the only PV-Wave reference with a single non-integer axis is a two-dimensional graphic display. In fact, none of the PV-Wave references, and in fact no reference cited by the Examiner, include a three-dimensional graphic display having a non-integer axis -- the PV-wave references all have three numerical axes and, as pointed out above, fail to disclose any virtual reality features. The inapplicability of the PV-Wave references to the claimed invention is further illustrated by the limited amount of information that can be displayed in a three-dimensional cartesian coordinate graphing system, such as PV-wave, in which every point in the display represents a defined location (e.g., x, y, z) and thus can only represent a single point of information. In contrast, Appellant's claimed invention including two non-integer axes is not bound by a three-dimensional cartesian coordinate system and as a result allows multiple different types of information to be displayed in a single three-dimensional virtual reality display, including multiple representations of information having the same value but distinguished, for example, on the basis of a non-integer value such financial instrument, industry group or country. See, e.g., Appellant's specification at p. 12, lines 3-17; p. 23, lines 7-24.

Furthermore, the §103 rejection cites the two-dimensional PV-Wave display of selected stocks versus cumulative percent change as an example of how PV-Wave allows for selection of inputs used in processing financial information. See Final Office Action at pp. 3-4. The Examiner admits that "PV-Wave 1 does not specifically disclose displaying financial information as a function of non-integer terrain parameters for two axes, and an axis display parameter for a third axis." See Id. at page 4, lines 2-4. However, the Examiner indicates that "PV-Wave does support three dimensional graphing and would be capable of such a display." See id. at page 4, lines 4-6.

Appellant respectfully submits that the test for rejecting any claim under 35 U.S.C. § 103 is not whether the

combination of prior art references is capable of providing all of the features of the claimed invention. In order to reject the claims under § 103, the prior art must teach or suggest each element of the claim and suggest combining the elements in the manner contemplated by the claimed invention. See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir.), cert. denied 111 S.Ct. 296 (1990); In re Bond, 910 F.2d 831, 834 (Fed. Cir. 1990).

The virtual reality generator recited in the claims of the above-identified application allows interaction with and immersion in the displayed data such that the user can view the data from different perspectives -- indeed independent claim 85 recites a three-dimensional virtual reality world, two axes of which have non-integer terrain parameters. In addition, Appellant respectfully submits that the virtual reality generator of the claimed invention is in no way taught or suggested by the "three dimensional graphing" that is alleged to be disclosed in PV-Wave 1 by the Examiner. Thus, Appellant respectfully asserts that a three-dimensional virtual reality world which allows interaction with and immersion in the data and two axes of which have non-integer terrain parameters is in no way disclosed in PV-Wave 1.

In the Final Office Action, the Examiner also alleges that "virtually all financial information of interest is pre-processed to some extent." See Final Office Action dated December 9, 1996, p. 2-3, paragraph 3. Even if, arguendo, the Examiner's assertion is correct, the references cited by the Examiner do not teach or suggest that pre-processed financial information is generated as a function of predetermined financial analytics on real-time and pre-stored financial data, as recited in, for example, independent claim 85. Appellant's independent claims recite a virtual reality generator displaying financial information as a three-dimensional virtual reality world by selecting a portion of pre-processed financial information as a function of non-integer terrain parameters and an axis display parameter, such as recited in independent claim 85. No portions of the cited

references have been identified as teaching or suggesting such a virtual reality generator. Therefore, Appellant respectfully submits that there is no suggestion or motivation to combine the cited references as asserted by the Examiner as none of the references teach or suggest a virtual reality display of selected portions of pre-processed financial information in a three dimensional coordinate system having two axes with non-integer terrain parameters, as recited in independent claim 85.

Moreover, Appellant respectfully submits that even if one were to combine the references, which is not warranted at least for the reasons set forth above, such a combination still fails to teach or suggest the claimed invention. For example, using the PV-Wave graphic display as a virtual reality application, for which there is no suggestion or teaching in the references to do nor is there any indication that it is even possible to use such a graphic display as a virtual reality application do so, would at best produce a virtual reality graphing application having a three-dimensional orthogonal, cartesian coordinate system, i.e., having three 90° intersecting numerical axes. Such a combination would not, however, provide a virtual reality display of pre-processed financial information in a three dimensional coordinate system having two axes with non-integer terrain parameters, as recited, for example, in independent claim 85. Indeed, the three-dimensional cartesian coordinate system of PV-Wave actually teaches away from the three dimensional non-cartesian coordinate system of the present invention.

The failure of the prior art to teach or suggest such a virtual reality financial information system as recited in independent claim 85 is further highlighted by the evidence of commercial success, industry praise and copying of the METAPHOR MIXER virtual reality system, the commercial embodiment of the virtual reality generator recited in claim 85. Such evidence was previously provided in the Rule 132 Declaration of the Appellant filed on July 17, 1995 in the

above-identified application. Assuming, arguendo, that prima facie obviousness has been established, which Appellant believes is not the case for the reasons set forth above, objective evidence such as commercial success must be considered before a conclusion on obviousness is reached.

Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc., 807 F.2d 955, 960 (Fed. Cir. 1986). Evidence of secondary considerations is entitled to great weight and can overcome even a prima facie obviousness rejection. Rosemount, Inc. v. Beckman Inst., Inc., 727 F.2d 1540, 1546 (Fed. Cir. 1985); Alco Standard Co. v. Tennessee Valley Authority, 808 F.2d 1490, 1500-01 (Fed. Cir. 1986).

In addition and contrary to the Examiner's assertion, Appellant respectfully submits that a prima facie case of the nexus between the provided evidence and the claimed invention has been clearly established by the Appellant. The Examiner asserts that the claims of the above-identified application "fail to recite many features ... which are present in the alleged commercially successful invention. See Final Office Action, at p. 12, lines 3-7. The Examiner also alleges that "[t]here is no single claim in the application which recites all of the features which appear to be present in the alleged commercially successful product." See Id., at p. 12, lines 7-9. Appellant respectfully points out that the commercially successful embodiment need not be identical to the claimed invention. See Applied Materials, Inc. v. Advanced Semiconductor Materials, 98 F.3d 1563, 1570 (Fed. Cir. 1996).

Appellant respectfully submits that as set forth in the Declaration of Paul S. Marshall, each element recited in each independent claim of the above-identified application is present in the commercial embodiment of the present invention and that the commercial success, copying and industry praise is due to the claimed invention and is entitled to substantial weight. Rosemount, 727 F.2d at 1546. Accordingly, the objective evidence of secondary considerations submitted by the Appellant, including evidence of (I) commercial success,

(ii) industry praise and (iii) copying, clearly demonstrates the nonobviousness of the claimed invention and establishes the requisite nexus between the evidence and the claimed invention. See Diversitech Corp. v. Century Steps, Inc., 850 F.2d 625 (Fed. Cir. 1988).

Furthermore, Appellant respectfully asserts that the seven (7) reference Section 103 rejection should be withdrawn because there is no suggestion, motivation or incentive in the references to combine the references as set forth in the rejection. Absent such suggestion, the rejection cannot be maintained. See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990); Heidelberger Druckmaschinen AG v. Hantsch Comm'l Prods., Inc., 21 F.3d 1068, 1072 (Fed. Cir. 1994). Further, the motivation to combine references cannot come from the invention itself. In re Oetiker, 977 F.2d 1443, 1447 (Fed. Cir. 1992).

The Examiner asserts that since "the references are within the same environment, they may be evaluated by what they would suggest to one of ordinary skill in the art". Assuming, *arguendo*, that the references are in the same environment (with which Appellant disagrees), the fact that references are in the general field of the invention is of no avail without a reason in the references to make the combination asserted by the Examiner. See Northern Telecom, 908 F.2d at 934; In re Oetiker, 977 F.2d at 1447; Heidelberger, 21 F.3d at 1072.

Moreover, hindsight reconstruction by decomposing an invention into its constituent parts, finding each part in the prior art and then reassembling the parts into the invention is impermissible ex post analysis. See Matter of Mahurkar Double Lumen Litigation, 831 F. Supp. 1354, 1374-75 (N.D. Ill. 1993) (citing In re Fritch, 972 F.2d 1260, 1265-66 (Fed. Cir. 1992)); see also Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1568 (Fed. Cir. 1987) (improper to use the patent as an instruction manual to lead to elements of the prior art); Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679 (Fed. Cir. 1988) (obviousness determination cannot use

invention as blueprint) (citing Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1143 (Fed. Cir. 1985)); Grain Processing Corp. v. American Maize-Products Co., 840 F.2d 902, 907 (Fed. Cir. 1988) (care must be taken to avoid hindsight reconstruction).

Appellant respectfully submits that the virtual reality generator recited in independent claim 85 is in no way taught or suggested by the references, either individually or even as a result of hindsight reconstruction of the references cited by the Examiner. As described in detail above, unlike any prior art system, including those cited in the references of record, the present invention, as recited in claim 85, selects portions of the pre-processed output of a financial analytic system for virtual reality processing to be displayed in a three-dimensional non-cartesian coordinate system, thereby generating a virtual reality world which provides a financial decisional and analytical tool that is neither taught nor suggested by the prior art.

Therefore, Appellant respectfully submits that the references cited by the Examiner, either individually or in combination, including the combination of all seven (7) references, neither teach nor suggest the present invention as recited in independent claim 85. Appellant respectfully submits that independent claims 104, 106, 118, 121 and 123-125 are also not taught or suggested by the references cited by the Examiner for the same reasons as claim 85.

As dependent claims depend from and therefore include all of the limitations of the amended independent claims, Appellant respectfully submits that dependent claims also are not taught or suggested by the references cited by the Examiner, either individually or in combination.

In view of the above, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

10. ARGUMENT - Group II

Claims 86 and 117 stand rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claims 86 and 117 depend from independent claims 85 and ~~107~~¹⁰⁴, respectively, arguments with respect to the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition, none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the display device is a visual stereoscopic head-mounted display device," as clearly recited in claims 86 and 117 of the above-identified application and thus render claims 86 and 117 separately patentable. Therefore, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

11. ARGUMENT - Group III

Claims 90 stands rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claim 90 depends from independent claim 85, arguments regarding the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition, none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the plurality of metaphors are rotatable," as clearly recited in claim 90 of the above-identified application and thus renders claim 90 separately patentable. Therefore, Appellant

respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

12. ARGUMENT - Group IV

Claim 95 stands rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claim 95 depends from independent claim 85, arguments with respect to the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition, none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the user interface module includes means for displaying a simulated cockpit," as clearly recited in claim 95 of the above-identified application and thus renders claim 95 separately patentable. Therefore, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

13. ARGUMENT - Group V

Claim 112 stands rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claim 112 depends from independent claim 106, arguments with respect to the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition, none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the financial information is pre-processed by a knowledge-

base system prior to receipt by the input module," as clearly recited in claim 112 of the above-identified application and thus renders claim 12 separately patentable. Therefore, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

14. ARGUMENT - Group VI

Claim 113 stands rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claim 113 depends from independent claim 106, arguments with respect to the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition, none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the financial information is pre-processed by a neural network prior receipt by the input module," as clearly recited in claim 113 of the above-identified application and thus renders claim 113 separately patentable. Therefore, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

15. ARGUMENT - Group VII

Claim 114 stands rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claim 114 depends from independent claim 106, arguments with respect to the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition,

none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the simulated movement is controlled by movement of a headset containing the display device," as clearly recited in claim 114 of the above-identified application and thus renders claim 114 separately patentable. Therefore, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

16. ARGUMENT - Group VIII

Claim 120 stands rejected under 35 U.S.C. § 103 as being unpatentable over the Rohrbough article and the Jacobson article, in further view of the Hindus article, the Saffo article, PV-Wave 1, PV-Wave 2, and PV-Wave 3. Appellant respectfully requests that the Board overturn this rejection in view of the following.

Since claim 120 depends from independent claim 118, arguments with respect to the Section 103 rejection of claims 85, 87-89, 91-94, 96-103, 105, 107-111, 115, 116, 118, 119 and 121-127 as discussed above are repeated herein. In addition, none of the references cited by the Examiner, either alone or in combination, even remotely teach, much less suggest that "the simulated movement is controlled by movement of a headset containing the display device," as clearly recited in claim 120 of the above-identified application and thus renders claim 120 separately patentable. Therefore, Appellant respectfully requests that the Board must reverse the Examiner's rejection under 35 U.S.C. § 103.

17.

CONCLUSION

The invention of the present application is new, non-obvious and useful in light of the references of record taken individually or in combination. Reversal of the Examiner's rejections of claims 85-92 and 94-127 is therefore respectfully requested.

Respectfully submitted,

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APPENDIX

85. A virtual reality generator to display pre-processed financial information as a virtual reality world, the virtual reality generator comprising:

an input module receiving the pre-processed financial information from a financial data feed system, the pre-processed financial data feed system generating the pre-processed financial information as a function of predetermined financial analytics on real-time and pre-stored financial data;

a user interface module including a first input selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter; and

a virtual reality generator module coupled to the input module and the user interface module, the virtual reality generator generating, continuously modifying, and displaying on a display device a virtual reality world being the three dimensional interface that enables a user to simulate movement through and interact with the pre-processed financial information, the virtual reality world representing selected portion of the pre-processed financial information,

wherein when the user simulates movement through and interacts with the pre-processed financial information, a user viewing the display device has a sensation of traveling through and within the virtual reality world.

86. The virtual reality generator of claim 85 wherein the display device is a visual stereoscopic head-mounted display device.

87. The virtual reality generator of claim 85, wherein the selected portion of pre-processed financial information is displayed as a plurality of metaphors in the virtual reality world.

88. The virtual reality generator of claim 87 wherein the plurality of metaphors include geometric primitives.

89. The virtual reality generator of claim 87 wherein the plurality of metaphors include polygons.

90. The virtual reality generator of claim 87 wherein the plurality of metaphors are rotatable.

91. The virtual reality generator of claim 87 wherein the plurality of metaphors have variable luminance.

92. The virtual reality generator of claim 87, wherein the user interface module further includes a third input for selecting at least one display parameter, and wherein at least a subset of the plurality of metaphors is displayed as a function of a predetermined one of the at least one display parameter.

93. The virtual reality generator of claim 87 wherein a subset of the plurality of metaphors is selected to flash by a predetermined one of the plurality of display parameters, each metaphor in the subset generated by the virtual reality module such that it flashes.

94. The virtual reality generator of claim 92, wherein the axis display parameter and the at least one display parameter represent attributes of financial instruments.

95. The virtual reality generator of claim 85 wherein the user interface module includes means for displaying a simulated cockpit.

96. The virtual reality generator of claim 85 wherein the virtual reality world is divided into a grid of sub-regions.

97. The virtual reality generator of claim 96 wherein the virtual reality world represents the pre-processed financial information for a single industry and each sub-region represents the pre-processed financial information for the single industry in one of a plurality of markets.

98. The virtual reality generator of claim 85 wherein the virtual reality world includes a plurality of metaphors representing a plurality of stocks, each one of the plurality of metaphors being generated as a function of the non-integer terrain parameters and the axis display parameter.

99. The virtual reality generator of claim 98 wherein each one of the plurality of metaphors have shape, size, position, behavior and color to represent financial information concerning one of the plurality of stocks.

100. The virtual reality generator of claim 85 wherein the virtual reality world is updated at least 30 times per second.

101. The virtual reality generator of claim 85 wherein the virtual reality generator module includes means for generating and simultaneously displaying a plurality of virtual reality worlds.

102. The virtual reality generator of claim 87 wherein the user interface module includes means for selecting one of

the plurality of metaphors and wherein the virtual reality generator module includes means for displaying information relating to the selected one of the plurality of metaphors as a function of the at least one display parameter.

103. The virtual reality generator of claim 102 further comprising means for producing sounds relating to the selected one of the plurality of metaphors.

104. A virtual reality generator to generate and display on a display device a stream of pre-processed financial information received from a financial analytic system, the virtual reality generator comprising:

an input module to continuously receive the stream of pre-processed financial information from the financial analytic system, the financial analytic system generating the pre-processed financial information as a function of predetermined financial analytics on real-time and pre-stored financial data;

a user interface module having a first input for selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter; and

a virtual reality generator module coupled to the input module and the user interface module, the virtual reality generator generating and displaying a virtual reality world on the display device, the virtual reality world being a three-dimensional representation of the stream of the pre-processed financial information displayable from a plurality of user selected perspectives to enable a user to simulate movement through the virtual reality world such that the user

has a sensation of travelling through and within the virtual reality world, the virtual reality generator module including:

- (i) means for generating and continuously modifying the virtual reality world so that the virtual reality world correspondingly represents the stream of the selected portion of the pre-processed financial information,
- (ii) means for causing the virtual reality world to be displayed on the display device, and
- (iii) means for simulating, on the display device, movement through the virtual reality world such that the user viewing the display device has a sensation of travelling through and within the virtual reality world.

105. The virtual reality generator of claim 104 wherein a view of the virtual reality world is generated by the virtual reality generator module at least 30 times per second, and wherein the virtual reality generator module further comprises means for updating the virtual reality world displayed on the display device at least 30 times per second.

106. A virtual reality generator to display on a display device pre-processed financial information, the virtual reality generator comprising:

an input module to receive the pre-processed financial information as input, the pre-processed financial information including real-time data and pre-stored data;

a user interface module having a first input for selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module the selected portion of the pre-processed financial information as a

function of the non-integer terrain parameters and the axis display parameter; and

a virtual reality generator module coupled to the input module and the user interface module, the virtual reality generator generating and displaying a virtual reality world on the display device, the virtual reality world being a three-dimensional representation of the selected portion of the pre-processed financial information continuously displayed from a plurality of user selected perspectives to enable a user to simulate movement through the virtual reality world such that the user has a sensation of travelling through and within the virtual reality world, the virtual reality generator module including

- (i) means for generating the virtual reality world representing the selected portion of the pre-processed financial information,
- (ii) means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives, and
- (iii) means for simulating, on the display device, movement through the virtual reality world such that the user viewing the display device has a sensation of travelling through and within the virtual reality world.

107. The virtual reality generator of claim 106 wherein a view of the virtual reality world is generated by the virtual reality generator module at least 30 times per second, and wherein the virtual reality generator module further comprises means for updating the virtual reality world displayed on the display device at least 30 times per second.

108. The virtual reality generator of claim 106 wherein the input module receives the financial information from a real-time data feed.

109. The virtual reality generator of claim 106 wherein the input module receives the financial information from a database of financial information.

110. The virtual reality generator of claim 106 wherein the input module receives the financial information from a real-time data feed and a database.

111. The virtual reality generator of claim 106 wherein the financial information is pre-processed by an analytic system prior to receipt by the input module.

112. The virtual reality generator of claim 106 wherein the financial information is pre-processed by a knowledge-base system prior to receipt by the input module.

113. The virtual reality generator of claim 106 wherein the financial information is pre-processed by a neural network prior receipt by the input module.

114. The virtual reality generator of claim 106 wherein the simulated movement is controlled by movement of a headset containing the display device.

115. The virtual reality generator of claim 106, wherein the user interface module further includes a third input for selecting at least one display parameter, and wherein the virtual reality world includes a plurality of metaphors, each one of the plurality of metaphors representing a subset of the selected portion of the pre-processed financial information.

116. The virtual reality generator of claim 106 wherein the display device is a monitor.

117. The virtual reality generator of claim 106 wherein the display device is a visual stereoscopic head-mounted display device.

118. A virtual reality generator to display on a display device pre-processed financial information as a virtual reality world, the virtual reality world being an interface that enables a user to simulate movement through the pre-processed financial information, the virtual reality generator comprising:

means for receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information, the data source providing real-time and pre-stored data;

a user interface module having a first input for selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter; and

a virtual reality generator module coupled to the input module and the user interface module, the virtual reality generator generating and displaying a virtual reality world on the display device, the virtual reality world being a three-dimensional representation of the pre-processed financial information displayable from a plurality of user selected perspectives to enable a user to simulate movement through the virtual reality world such that the user has a sensation of travelling through and within the virtual reality world, the virtual reality generator module including means for:

(i) generating, in real-time as the selected portion of the pre-processed financial information is received from the real-time data source of financial information, the virtual reality world representing the pre-processed financial information,

(ii) displaying in real-time on the display device the virtual reality world representing the selected portion of the pre-processed financial information,
(iii) displaying the virtual reality world from a plurality of perspectives, and
(iv) simulating in real-time, on the display device, movement through the virtual reality world.

119. The virtual reality generator of claim 118 wherein the virtual reality world is updated at least 30 times per second.

120. The virtual reality generator of claim 118 wherein the virtual reality generator module includes means for generating and simultaneously displaying a plurality of virtual reality worlds.

121. The virtual reality generator of claim 118, wherein the selected portion of the pre-processed financial information is displayed as a plurality of metaphors in the virtual reality world.

122. The virtual reality generator of claim 121 wherein the virtual reality generator module includes means for selecting one of the plurality of metaphors and wherein the virtual reality generator module includes means for displaying information relating to the selected one of the plurality of metaphors.

123. A virtual reality generator, comprising:
an input module to receive packets of pre-processed financial information at regular predetermined intervals, the pre-processed financial information being generated as a function of real-time and pre-stored financial data;

a user interface module having a first input for selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter;

display means coupled to the input module and the user interface module, the display means for displaying on a display device a virtual reality world generated from the packets of the selected portion of the pre-processed financial information, the virtual reality world being a three-dimensional representation of the packets of the selected portion of the pre-processed financial information continuously displayed from a plurality of user selected perspectives to enable a user to simulate movement through and interact with the virtual reality world such that the user, when viewing the display device, has a sensation of travelling within the virtual reality world; and

processing means for updating the virtual reality world when a new packet of pre-processed financial information is received by the input module.

124. A computer-based method for displaying and manipulating large quantities of pre-processed financial information, the method comprising the steps of:

receiving as input the pre-processed financial information, the pre-processed financial information being generated as a function of real-time and pre-stored data;

selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and an axis display parameter for a third axis of the three dimensional interface;

selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter for display;

generating a virtual reality world from the selected portion of the pre-processed financial information, the virtual reality world being a three-dimensional representation of the pre-processed financial information capable of being displayed from a plurality of user selected perspectives to enable a user to simulate movement through the virtual reality world; and

displaying on a display device the virtual reality world as the three-dimensional interface that enables simulation of movement through and interaction with the pre-processed financial information such that the user, when viewing the display device, has a sensation of travelling through and within the pre-processed financial information displayed as the virtual reality world.

125. A computer implemented method for displaying and manipulating pre-processed financial information, the method comprising the steps of:

continuously receiving as input packets of the pre-processed financial information, the pre-processed financial information including real-time and pre-stored data;

selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and an axis display parameter for a third axis of the three dimensional interface;

selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter for display;

generating, utilizing a computer processor, a virtual reality world from the packets of pre-processed financial information, the virtual reality world representing the selected portion of the pre-processed financial information and capable of being displayed from a plurality of

perspectives to enable a user to simulate movement through the virtual reality world;

displaying the virtual reality world as a three-dimensional representation on a display device such that a user can simulate movement through the pre-processed financial information;

updating, utilizing the computer processor, the virtual reality world on the display device when the selected portion of the pre-processed financial information is received; and

simulating movement through the virtual reality world on the display device such that the user, when viewing the display device, has a sensation of travelling through and within the virtual reality world.

126. The virtual reality generator of claim 85, wherein the non-integer terrain parameter includes one of an industry group, a country, a market and a type of financial instrument.

127. The virtual reality generator of claim 92, wherein the at least one display parameter displays the subset of the plurality of metaphors via one of a flashing, a spinning, a rotation, a shaping, a coloring and a texturing of the subset of the plurality of metaphors.